

FFAG GAS FILLED STORAGE RINGS FOR MUON COOLING

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Previous studies of weak-focusing scaling gas-filled rings for muon cooling have been discussed at the August Fermilab ringcooler meeting.

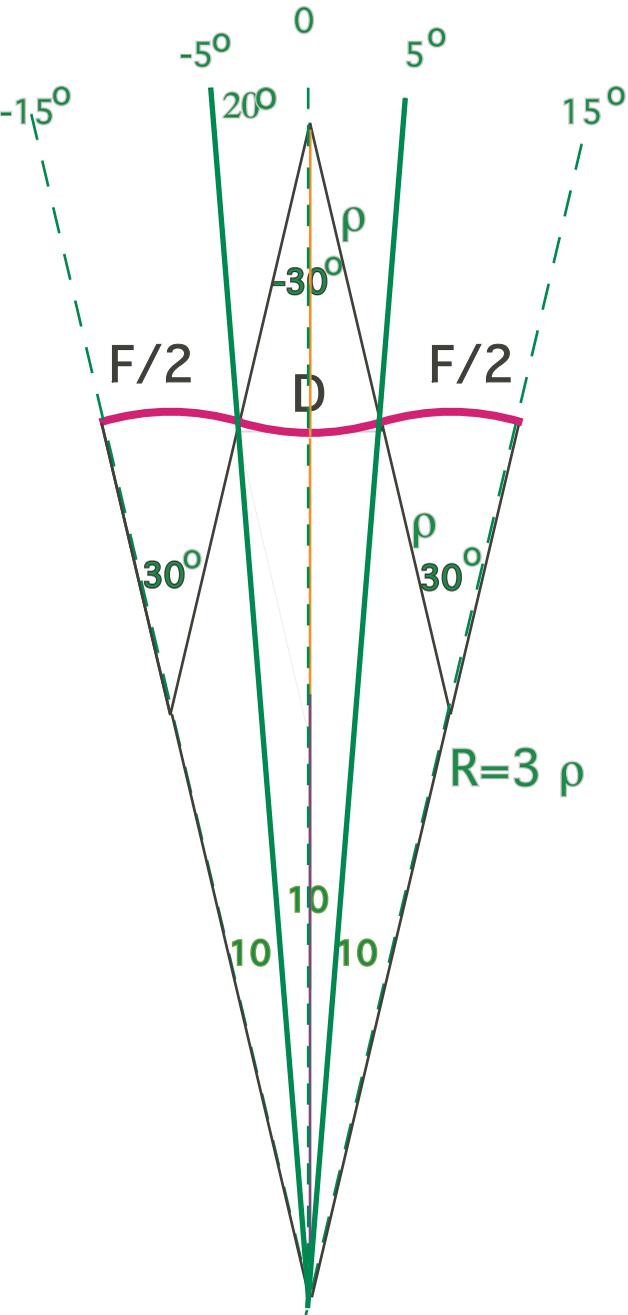
To obtain reasonable performance with this approach requires that the ring be quite small - with circumference around 2 meters. This has some drawbacks.

Another approach is to use radial sector scaling FFAG rings. Unlike the weak-focusing rings which use sector zero-gradient magnets separated by drifts, the FFAG rings have sector magnets that alternate both in gradient and in field direction. They may, in addition, have drift spaces.

The next 5 slides show a 12 cell ring without gaps. The 6th slide shows the geometry of one cell in a ring with drifts between the cells.

12 Cell Ring without Drifts

Layout of 1 Cell



$$k = nd = -nf = 2.7$$

$$B/B_0 = (R/R_0)^k = (\rho/\rho_0)^{-n}$$

$$P/P_0 = (R/R_0)^{k+1}$$

$$(R/R_0) = (P/P_0)^{1/k+1}$$

$$D = dR/d(\rho/\rho_0) = R/(k+1) = .2581\text{m}$$

$$L_f = .3333\text{m} ; L_d = .1667\text{m}$$

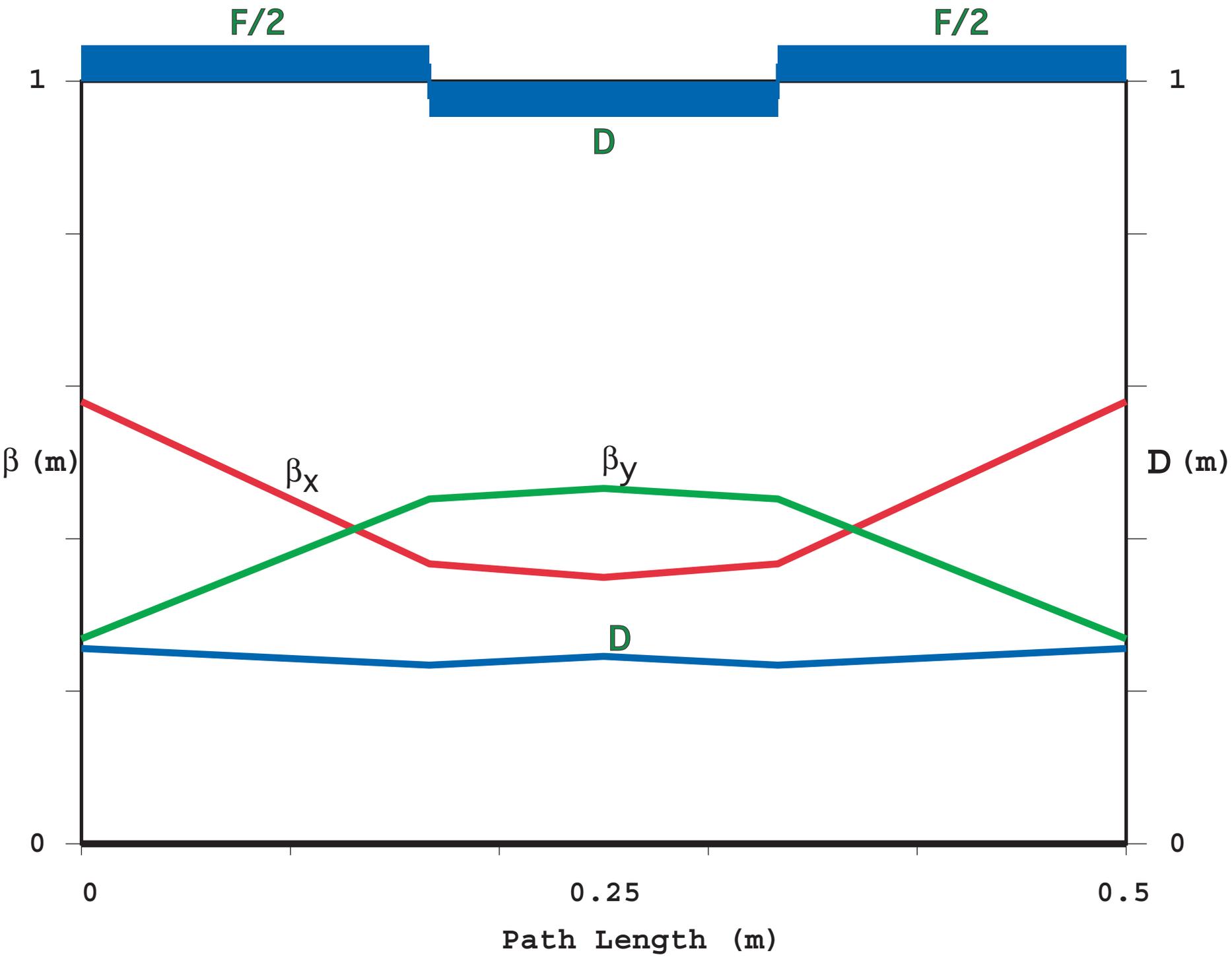
$$L_{\text{cell}} = 0.5\text{m} ; \text{Circumference} = 6\text{m}$$

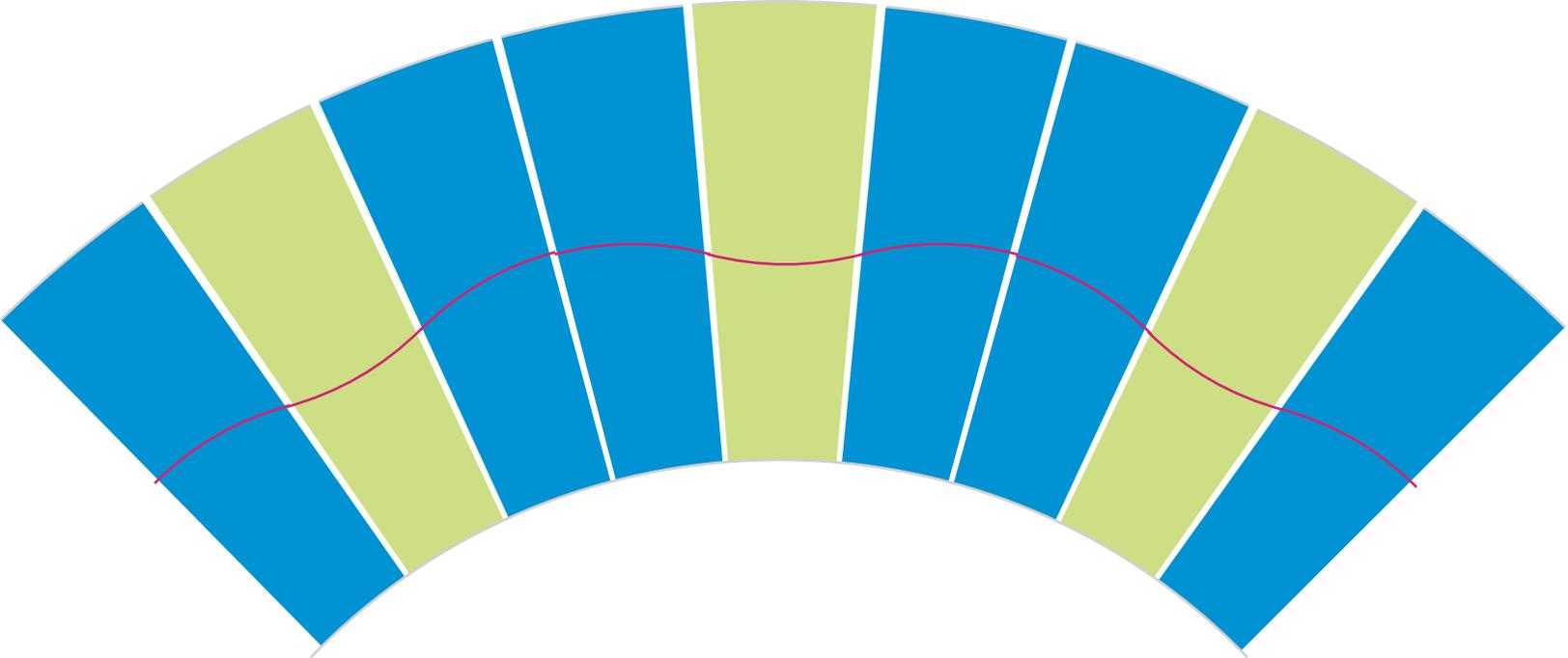
$$\rho_0 = .3183\text{m} ; R_0 = .9549\text{m} ; B_0 = 2.620\text{T}$$

$$p_c = 0.25 \text{ GeV} ; B \rho = 0.8339 \text{ m}$$

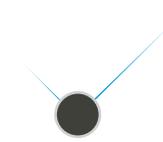
Ring Center

SCALING FFAG 12-CELL COOLING RING - LATTICE FUNCTIONS OF ONE CELL





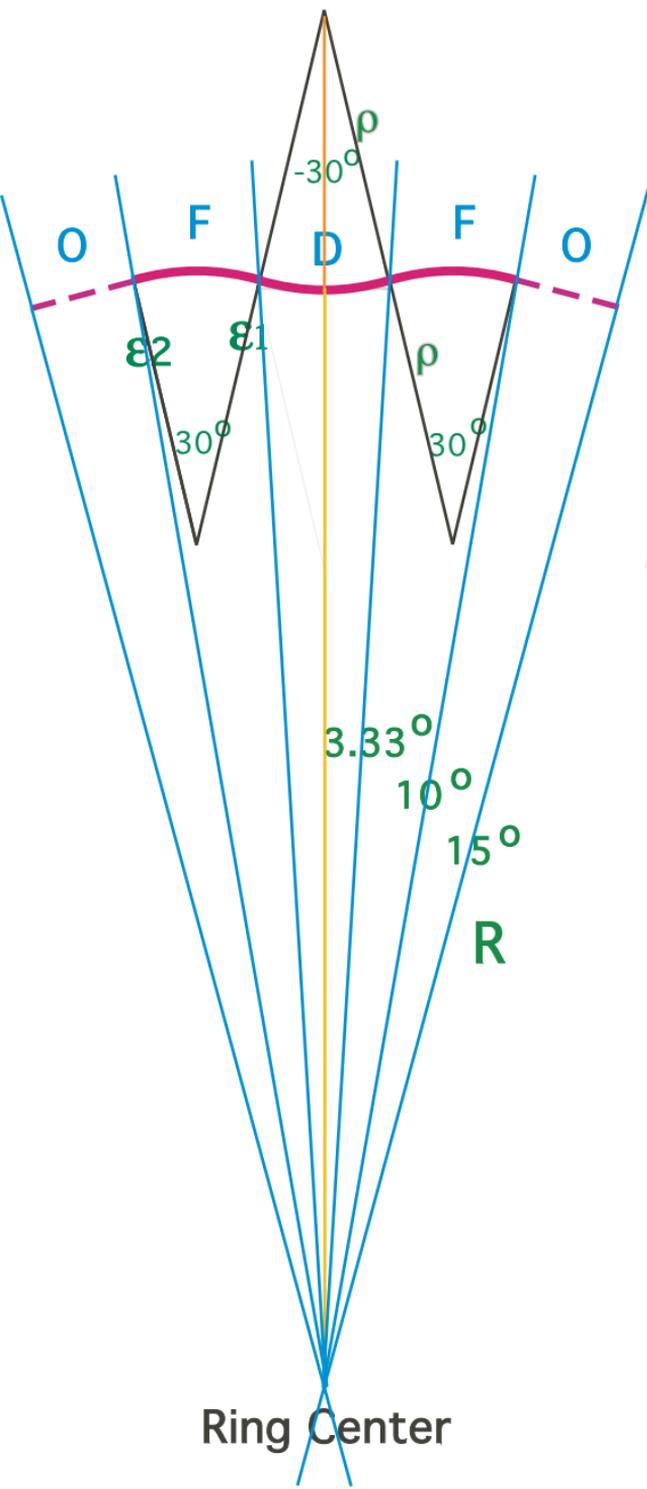
3 Cells - 90°



P/P0	P GeV/c	R/R0	ρ m	R m	R-R0 m
1.3	.325	1.0735	.342	1.025	.0702
1.2	.300	1.0505	.334	1.003	.0482
1.1	.275	1.0261	.327	0.980	.0249
1.0	.250	1.0000	.318	0.955	.0000
0.9	.225	.9719	.309	0.928	-.0268
0.8	.200	.9415	.300	0.899	-.0559
0.7	.175	.9081	.289	0.867	-.0878

12 CELL RING WITH DRIFTS

Cell Layout



$$LF = .167$$

$$LD = .167$$

$$LO = .125$$

$$L_{\text{cell}} = .75\text{m}$$

$$\text{Circ} = 9\text{m}$$

$$\rho = .32$$

$$R \sim 4\rho \sim 1.3$$

$$\epsilon_1 = 16.7$$

$$\epsilon_2 = 3.4$$